At the Institute for Computational Modeling in Civil Engineering of the Technische Universität Braunschweig a position is available as a

Scientific Assistant
(pay group 13 TV-L)

for the project funded by the German Research Foundation (DFG)

Data-driven simulation of microstructure in powder bed fusion processes

Lack of understanding in the interaction of process, structure and properties (PSP) still prevents the additive metal production of functional graded materials. In recent years, numerous numerical simulation tools have been developed to study the PSP interaction. However, these cannot keep up with the flexibility that additive manufacturing offers developers in terms of design. The reason is the transient nature of additive manufacturing and the sheer number of influencing parameters. Therefore, in this project a data-driven approach based on convolutional neural networks shall be developed to predict the microstructural evolution.

The position is available immediately and is limited for a duration of 36 months. An extension upon positive evaluation of the project about 12 months is envisioned. The payment is according EG 13 TV-L. The position offers the possibility of a doctorate, which is expressly supported by the professorship.

About us
The working group Data-Driven Modeling and Simulation of Mechanical Systems is headed by Prof. Dr.-Ing. Henning Wessels. Currently, five research associates are part of the group. Our focus is fundamental research at the interface between machine learning and numerical simulation. Where conventional simulation methods reach their limits, e.g. in inverse or multi-scale problems, we develop tailored machine learning methods. Against the background of digital twins, we also aim to extend the application of numerical simulation by relating it to measurement and monitoring data that accrue over the entire product life cycle.
Your tasks

- Independent literature review and conceptualization of numerical and data-driven methods
- Implementation of a thermal Finite Element code for the efficient simulation of the powder bed fusion process
- Implementation of a cellular automata approach for the microstructure simulation
- Implementation of a convolutional neural network and development of an approach for the data-driven simulation of microstructure
- Writing scientific publications and project reports
- Presentation of project results at (inter-)national conferences

Qualification requirements

- Above-average academic degree in engineering, mathematics, material or natural sciences (master's degree or comparable)
- Sound knowledge of numerics and machine learning, demonstrated by attendance of relevant courses and related student projects/theses
- Knowledge of a programming language, preferably Python

What we expect

- Experience in programming, also using methods such as git and docker
- Intrinsic motivation for independent, scientific research
- Profound English skills
- Team spirit and strong communication skills

What we offer

- Attractive work environment in a committed young team
- Great creative freedom with plenty of room for own ideas and personal development
- Participation in continuing education programs of the Graduate Academy GradTUBS
- Individual support to conduct a research stay abroad
- A pleasant office atmosphere - but home office is possible

Application

Please send your meaningful application documents in one PDF file with the usual documents (letter of motivation, CV, copies of certificates, references) as soon as possible, but no later than November 15, 2022, by e-mail to:

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The Technische Universität Braunschweig strives to reduce under-representation in all areas and positions in the sense of the NGG. Therefore, applications from women are particularly welcome. Severely handicapped persons are preferred in case of equal suitability. Proof of eligibility must be submitted. Applications from people of all nationalities are welcome. Personal data will be stored for the purposes of the application process. Application costs cannot be reimbursed.